Advanced pressure management

City of Cape Town, South Africa

water scarcity impact

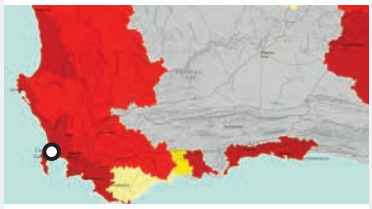
Reduced withdrawal	●
Reduced consumption	●
Improved water quality	
Increased productivity	●
Net basin benefit	●

volumetric impact
9 000 000 m^3/yr

capital cost
$700 000

estimated unit cost of water
<5 ¢/m^3

Water Stress
Cape Town, South Africa



Arid & low water use
Low (<10%)
Low to med (10-20%)
Med to high (20-40%)
High (40-80%)
Extremely high (>80%)
No data available

Water Stress Map:
Gassert, F., M. Landis, M. Luck, P. Reig, and T. Shiao. 2013. "Aqueduct Global Maps 2.0."

Confidence level
Low Medium High

Water Scarcity Impact Key
Main Minor

Credits
We wish to acknowledge the input of the City of Cape Town and the township of Khayelitsha in the preparation of this case study.

Project Overview

Khayelitsha is one of the largest townships in South Africa with a popultaion of 450 000. It is located approximately 20km from Cape Town Central Business District on the Cape Flats, a large flat sandy area at or near sea level. In the early 2000s, an investigation into leakage levels established that the water lost could almost fill an Olympic sized swimming pool every hour. The main source was identified as household leakage and in particular poor quality plumbing fittings which have been badly damaged through constant exposure to high pressure. Such leakage resulted in very high water use in most properties and high levels of non-payment since the customers could not afford to pay for new taps and toilet fittings, let alone their high water bills. The Khayelitsha Pressure Management Project was commissioned in 2001 to improve the level of service to the Khayelitsha community by reducing the excessive water pressure and pressure fluctuations in the reticulation system, particularly during the off-peak periods of low demand. Resultant water savings were immediate, sustainable and exceeded the most optimistic projections, amounting to almost 40% of the original supply.

Key Elements

- Measurement of night flows to estimate leakage levels.
- Extensive community consultation and participation at all stages of the project created favourable conditions for project implementation.
- Labour-based construction using locally available labour was an important part of the project and a prerequisite for community support.
- Advanced pressure management techniques were employed to reduce the excessive water pressure and pressure fluctuations in the reticulation system.
- Financing of $700 000 was provided by the municipality.

Key Outcomes

- Major savings on water purchases from the bulk water supplier: four month payback.
- Reduced wastage of water through leakage repairs especially on internal reticulation networks.
- Water savings of approximately 9 000 000m^3/yr achieved representing $5m per annum of bulk water purchases.
- Awareness and education efforts have helped to create consumer support for water use efficiency in the area.
- In this local context the reduction of leakage reduces consumptive use as in this location leakage is generally lost to saline sources.

Cape Town, South Africa

Intervention Features

- Pressure management in municipalities
- Stakeholder engagement

Project Levers

(1) Measurement of night flows:

The level of leakage was estimated from the analysis of the night-time water use to be almost three-quarters of the water supplied to the area. The Minimum Night Flow (MNF) was measured to be in excess of 1 600m^3/hr which is almost sufficient to fill an Olympic sized swimming pool every hour.

(2) High level of community consultation and participation:

A key element of the project was meaningful public participation and awareness activities to educate the consumers on the need to conserve water. As a result of the community support, the project was constructed in a squatter area without any theft, intimidation or vandalism of any nature.

(3) Labour-based construction:

Labour based construction techniques were used wherever possible to create employment in the local community which was a prerequisite for the community support. More than fifty local residents were employed during the six month construction period for the project.

(4) Advanced pressure management:

This was the first time that Advanced Pressure Management had been used to control the water pressure into such a large area supplying almost 80 000 properties from a single main supply point. The project utilised both flow and time based electronic controllers sourced from the UK company technology. Due to the very high levels of leakage, it was found that the most basic form of advanced pressure control (time control) was the most appropriate for the area although more than 60% of the savings were created directly from the main pressure reducing valve without any additional electronic control.

(5) Financing model:

Financing was provided by the municipality of Cape Town and was justified on the basis of projected bulk water savings.

Outcomes and Challenges

The average daily flow was reduced from 2 500m^3/hr to 1 500m^3/hr representing an annual saving of 9 000 000m^3 or approximately 40% of the original water use. The Minimum Night Flow was reduced from 1 600m^3/hr to 750m^3/hr. Local labour was used throughout the project and the community support was a key factor in the successful implementation of the project.

It should be noted that the latest estimates of savings achieved from the installation made by the municipality of Cape Town suggest financial savings of $5m per year.

This project remains fully operational more than twelve years after it was commissioned. The sustainability of this project is due to continued support from competent and dedicated personnel within the municipality of Cape Town who took over the operation and maintenance of the installation shortly after commissioning.

Above: External view of the Khayelitsha pressure management installation, (© City of Cape Town);
Khayelitsha pressure management installation, (© WRP (Pty) Ltd)